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SWITCHABLE ZERO ORDER DIFFRACTION GRATINGS AS LIGHT
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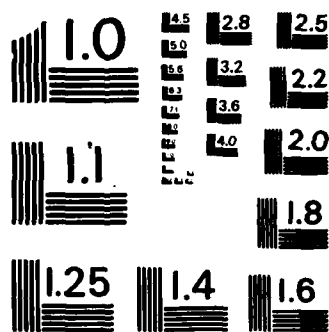
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SEMIANNUAL REPORT

AD-A171 052

"SWITCHABLE ZERO ORDER DIFFRACTION GRATINGS AS LIGHT VALVES"

BY

JOHN MELNGAILIS

FOR THE PERIOD:

1 OCTOBER 1985 TO 31 MARCH 1986

OFFICE OF NAVAL RESEARCH

CONTRACT NO. N00014-84-K-0073

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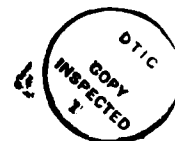
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The work on light valves has essentially stopped and all efforts have been directed to the added task on "focused ion beam assisted deposition". The only exception is work done to prepare a paper on "The Investigation on Embossing of Fine Features into Solid Polymer Films" for the Society of Plastics Engineers meeting.)

In the area of focused ion beam assisted deposition our work has concentrated on depositing metal patterned with submicron resolution without the use of a mask or resist. This has applications to integrated circuit rewiring, repair, or prototyping and to the repair of defects in x-ray lithography masks. 4

1. A focused ion beam system with a 15 kV ion column has been borrowed from Ion Beam Technologies, and assembled on the MIT campus. A capillary gas feed has been installed to perform ion assisted deposition. (A 50 kV column with 0.05 μm resolution has been purchased, and funds for a chamber have also been obtained.)
2. With the 15 kV apparatus tungsten has been deposited starting from a gas of WF_6 . The deposit was found to contain a significant percentage of oxygen (~30%). We have, therefore, concluded that a better vacuum is needed and have purchased a titanium sublimation pump which should achieve a pressure in the 10^{-8} Torr range.
3. Since gold is a less active and does not getter oxygen as readily as tungsten, we have deposited gold films from a gas of dimethyl-

gold-hexafluoro-acetylacetonate. For this the gas feed had to be modified since the compound only has a vapor pressure of 0.4 mm Hg at room temperature. Preliminary results indicate a deposition rate of 10 atoms/incident ion and a film with no detectable impurities. This work is being pursued.

4. An apparatus has also been assembled to study the ion assisted deposition using an implanter as the source of ions. This apparatus has also yielded gold deposits, and, in addition silicon deposits from SiCl_4 .



Letter on file

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